

CLAIMS

What is claimed is:

1. A plasma arc torch comprising:
 - a torch head;
 - a proximal anode member disposed within the torch head;
 - a cathode disposed within the torch head;
 - a central body disposed adjacent the torch head; and
 - torch consumables disposed adjacent a distal end portion of the torch head, the torch consumables comprising:
 - an electrode in electrical contact with the cathode and disposed within the central body;
 - a tip disposed adjacent the electrode;
 - a spacer disposed between the electrode and the tip;
 - a baffle disposed around the central body;
 - a distal anode member disposed between the central body and the baffle, the distal anode member in electrical contact with the tip;
 - a central anode member disposed adjacent a proximal end portion of the distal anode member and in electrical contact with the distal anode member and the proximal anode member;
 - a shield cap disposed around the baffle;
 - a secondary cap disposed against an interior surface of the shield cap, the secondary cap comprising a plurality of crenulations at a proximal end portion; and

a secondary spacer disposed between the tip and the secondary cap,

wherein a plasma gas, a secondary gas, a cooling fluid, and current are conducted through the torch head, the central body, and torch consumables for operation of the plasma arc torch.

2. The plasma arc torch according to claim 1, wherein the secondary cap further comprises an interior portion defining a plurality of flutes for the passage of secondary gas.

3. A plasma arc torch comprising:
- a torch head;
 - a proximal anode member disposed within the torch head;
 - a cathode disposed within the torch head;
 - a central body disposed adjacent the torch head; and
 - torch consumables disposed adjacent a distal end portion of the torch head, the torch consumables comprising:
 - an electrode in electrical contact with the cathode and disposed within the central body;
 - a tip disposed adjacent the electrode;
 - a spacer disposed between the electrode and the tip;
 - a baffle disposed around the central body;
 - a distal anode member disposed between the central body and the baffle, the distal anode member in electrical contact with the tip;
 - a central anode member disposed adjacent a proximal end portion of the distal anode member and in electrical contact with the distal anode member and the proximal anode member;
 - a shield cap disposed around the baffle;
 - a secondary cap disposed against an interior surface of the shield cap, the secondary cap comprising an interior portion defining a plurality of flutes; and

a secondary spacer disposed between the tip and the secondary cap, wherein the plurality of flutes form a gas passageway between the secondary spacer and the secondary cap,

wherein a plasma gas, a secondary gas, a cooling fluid, and current are conducted through the torch head, the central body, and torch consumables for operation of the plasma arc torch.

4. The plasma arc torch according to claim 3, wherein the secondary cap further comprises a proximal end portion defining a plurality of crenulations for the passage of secondary gas.

5. A plasma arc torch comprising:
- a torch head;
 - a proximal anode member disposed within the torch head;
 - a cathode disposed within the torch head;
 - a central body disposed adjacent the torch head; and
 - torch consumables disposed adjacent a distal end portion of the torch head, the torch consumables comprising:
 - an electrode in electrical contact with the cathode and disposed within the central body;
 - a tip disposed adjacent the electrode;
 - a spacer disposed between the electrode and the tip;
 - a baffle disposed around the central body;
 - a distal anode member disposed between the central body and the baffle, the distal anode member in electrical contact with the tip;
 - a central anode member disposed adjacent a proximal end portion of the distal anode member and in electrical contact with the distal anode member and the proximal anode member;
 - a shield cap disposed around the baffle;
 - a secondary cap disposed against an interior surface of the shield cap; and
 - a secondary spacer disposed between the tip and the secondary cap, the secondary spacer comprising an exterior portion defining a

plurality of flutes that form a gas passageway between the secondary spacer and the secondary cap,

wherein a plasma gas, a secondary gas, a cooling fluid, and current are conducted through the torch head, the central body, and torch consumables for operation of the plasma arc torch.

6. The plasma arc torch according to claim 5, wherein the secondary spacer further comprises a proximal end portion defining a plurality of crenulations for the passage of secondary gas.

7. A plasma arc torch comprising:
- a torch head;
 - a proximal anode member disposed within the torch head;
 - a cathode disposed within the torch head;
 - a central body disposed adjacent the torch head; and
 - torch consumables disposed adjacent a distal end portion of the torch head, the torch consumables comprising:
 - an electrode in electrical contact with the cathode and disposed within the central body;
 - a tip disposed adjacent the electrode;
 - a spacer disposed between the electrode and the tip;
 - a baffle disposed around the central body;
 - a distal anode member disposed between the central body and the baffle, the distal anode member in electrical contact with the tip;
 - a central anode member disposed adjacent a proximal end portion of the distal anode member and in electrical contact with the distal anode member and the proximal anode member;
 - a shield cap disposed around the baffle;
 - a secondary cap disposed against an interior surface of the shield cap; and
 - a secondary spacer disposed between the tip and the secondary cap, the secondary spacer comprising a plurality of crenulations at a proximal end portion,

wherein a plasma gas, a secondary gas, a cooling fluid, and current are conducted through the torch head, the central body, and torch consumables for operation of the plasma arc torch.

8. The plasma arc torch according to claim 7, wherein the secondary spacer further comprises an exterior portion defining a plurality of flutes for the passage of secondary gas.

9. A secondary cap for use in a plasma arc torch comprising:
a plurality of crenulations formed around a distal end portion; and
a plurality of flutes formed along an interior portion,

wherein the crenulations and flutes form gas passageways between the secondary cap and adjacent components of the plasma arc torch for the flow of a secondary gas.

10. The secondary cap according to claim 9 further comprising a distal protrusion formed around a distal end portion of the secondary cap to block molten splatter during operation of the plasma arc torch.

11. The secondary cap according to claim 9 further comprising a plurality of secondary gas vent passageways.

12. The secondary cap according to claim 11, wherein the secondary gas vent passageways are angled outward.

13. The secondary cap according to claim 11, wherein the secondary gas vent passageways are axial.

14. A secondary spacer for use in a plasma arc torch comprising:
a plurality of crenulations formed around a distal end portion; and
a plurality of flutes formed along an interior portion,

wherein the crenulations and flutes form gas passageways between the secondary spacer and adjacent components of the plasma arc torch for the flow of a secondary gas.

15. The secondary spacer according to claim 14 further comprising a plurality of secondary gas swirl passageways.

16. A secondary cap for use in a plasma arc torch comprising a distal protrusion formed around a distal end portion of the secondary cap to block molten splatter during operation of the plasma arc torch.

17. The secondary cap according to claim 14 further comprising an annular groove and a splatter shield disposed within the annular groove.

18. The secondary cap according to claim 16, wherein the distal protrusion is angled.

19. The secondary cap according to claim 16, wherein the distal protrusion is lateral.

20. A splatter shield for use in blocking molten splatter from contacting a shield cap of a plasma arc torch, the splatter shield being formed of a flexible material and adapted for installation around a secondary cap.